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(54) METHOD FOR MANAGING RECORDED STREAMS IN A REWRITABLE RECORDING MEDIUM

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(57) **ABSTRACT**

A method and apparatus for managing digital content are discussed. According to an embodiment, the method includes receiving digital content and protection information for protecting the digital content; obtaining at least one of user interface application data and marker private data; and managing the digital content according to the at least one of user interface application data and marker private data, wherein the managing step prevents a user from performing an action related with unauthorized usage of the digital content.

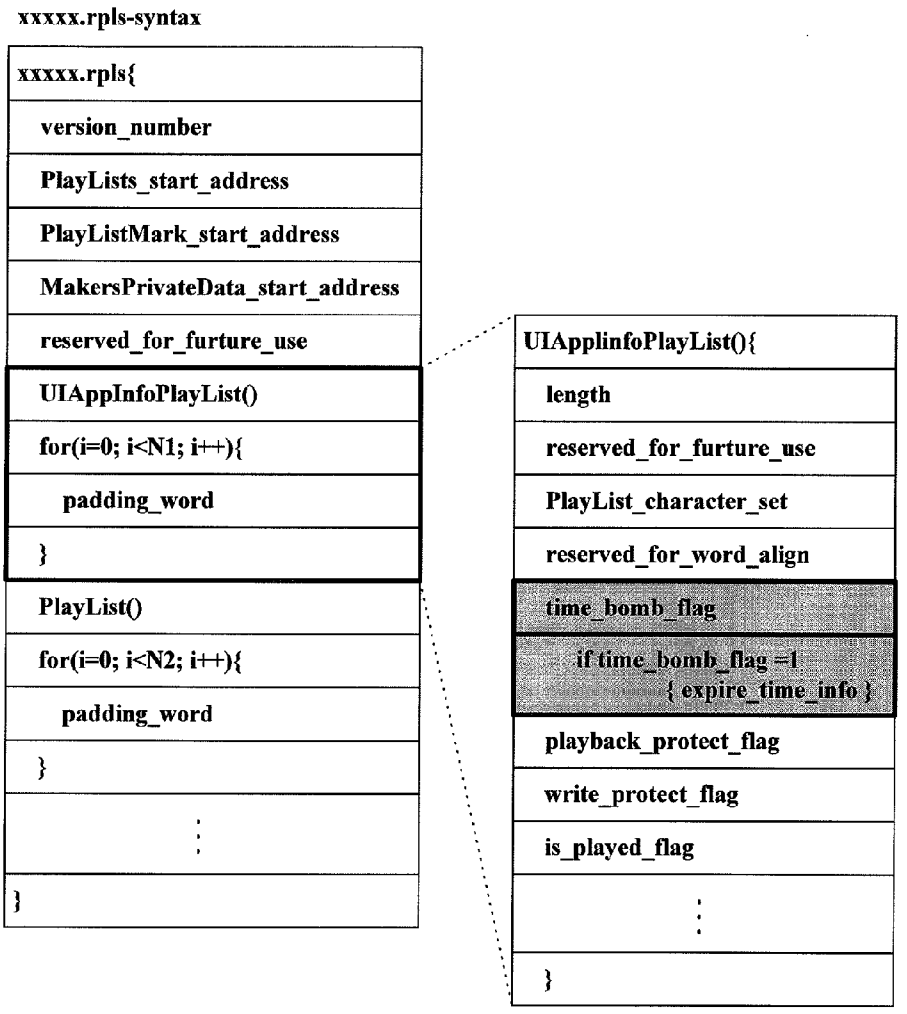


FIG. 1

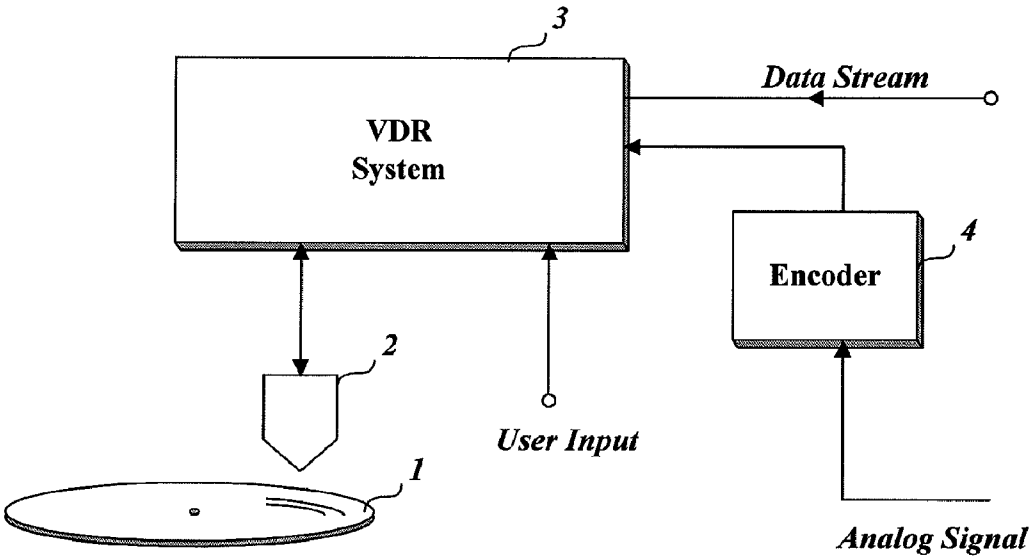

3
VDR
System
Data Stream
Encoder
4
2
User Input
1
Analog Signal

FIG. 2

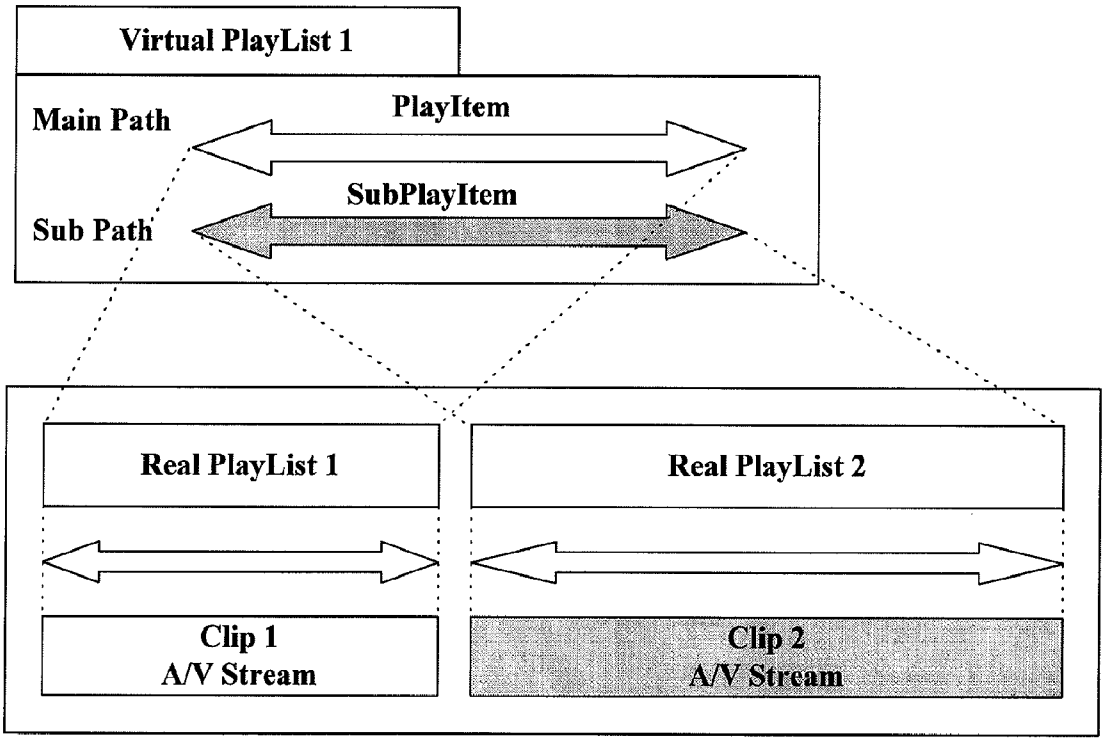

Virtual PlayList 1
Main Path
PlayItem
SubPlayItem
Sub Path
Real PlayList 1
Real PlayList 2
Clip 1
A/V Stream
Clip 2
A/V Stream

FIG. 3

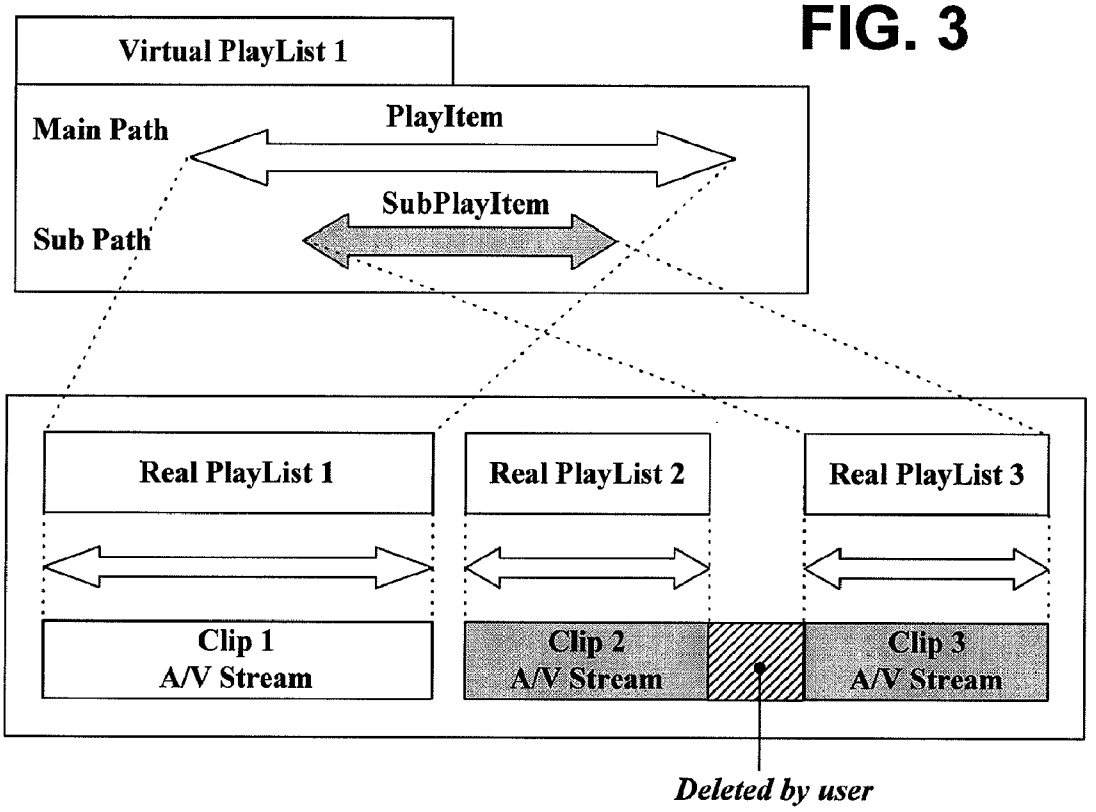

Virtual PlayList 1
Main Path
PlayItem
Sub Path
SubPlayItem
Real PlayList 1
Real PlayList 2
Real PlayList 3
Clip 1
A/V Stream
Clip 2
A/V Stream
Clip 3
A/V Stream
Deleted by user

FIG. 4

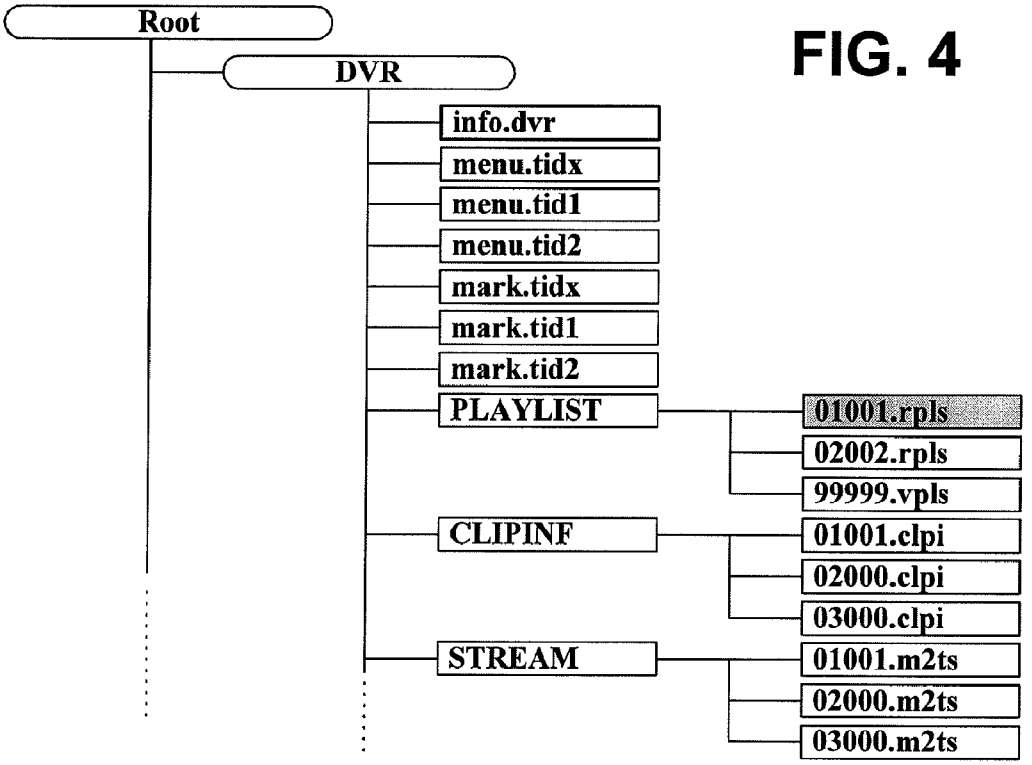

Root
DVR
info.dvr
menu.tidx
menu.tid1
menu.tid2
mark.tidx
mark.tid1
mark.tid2
PLAYLIST
01001.rpls
02002.rpls
99999.vpls
CLIPINF
01001.clpi
02000.clpi
03000.clpi
STREAM
01001.m2ts
02000.m2ts
03000.m2ts

FIG. 5

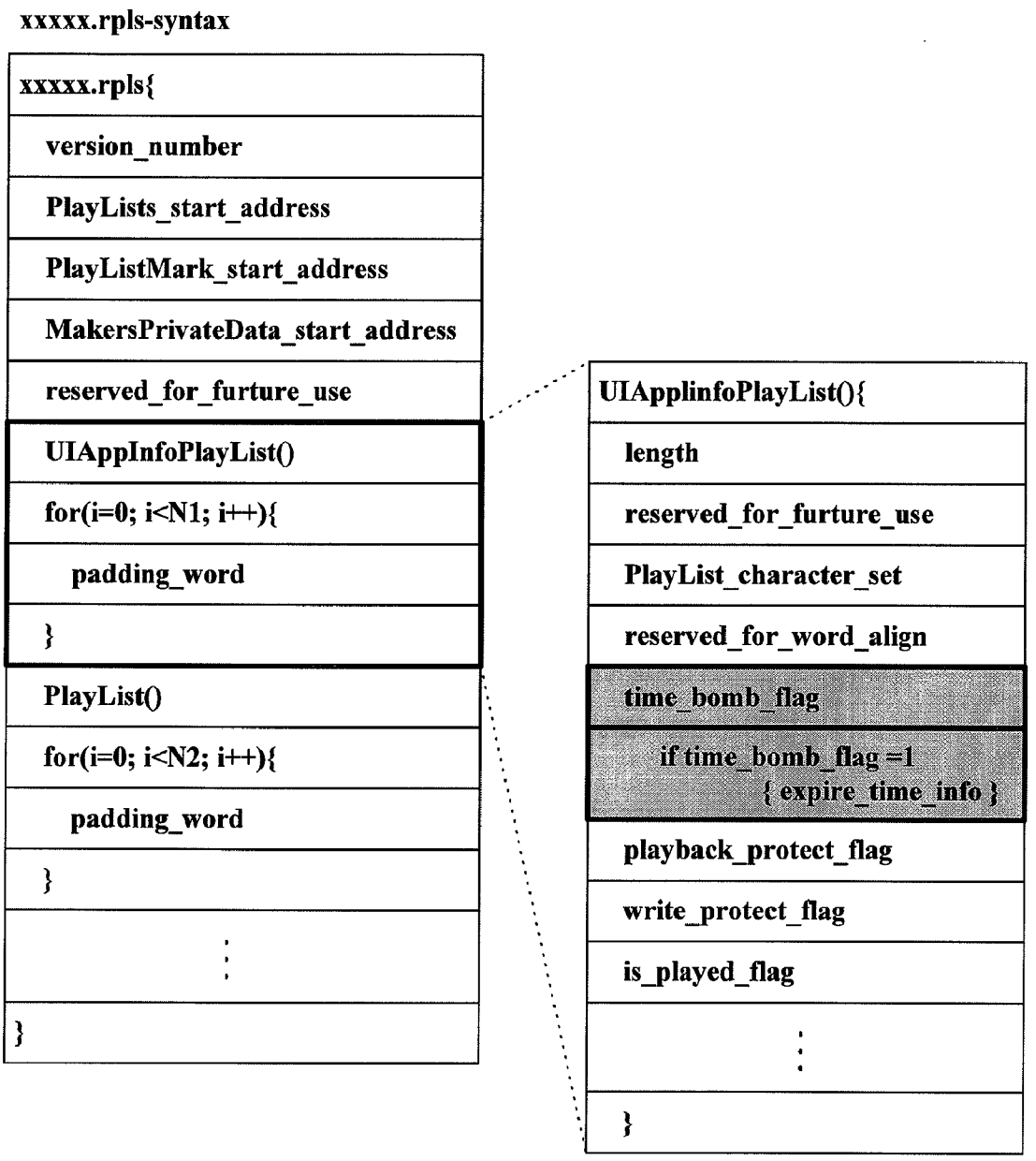
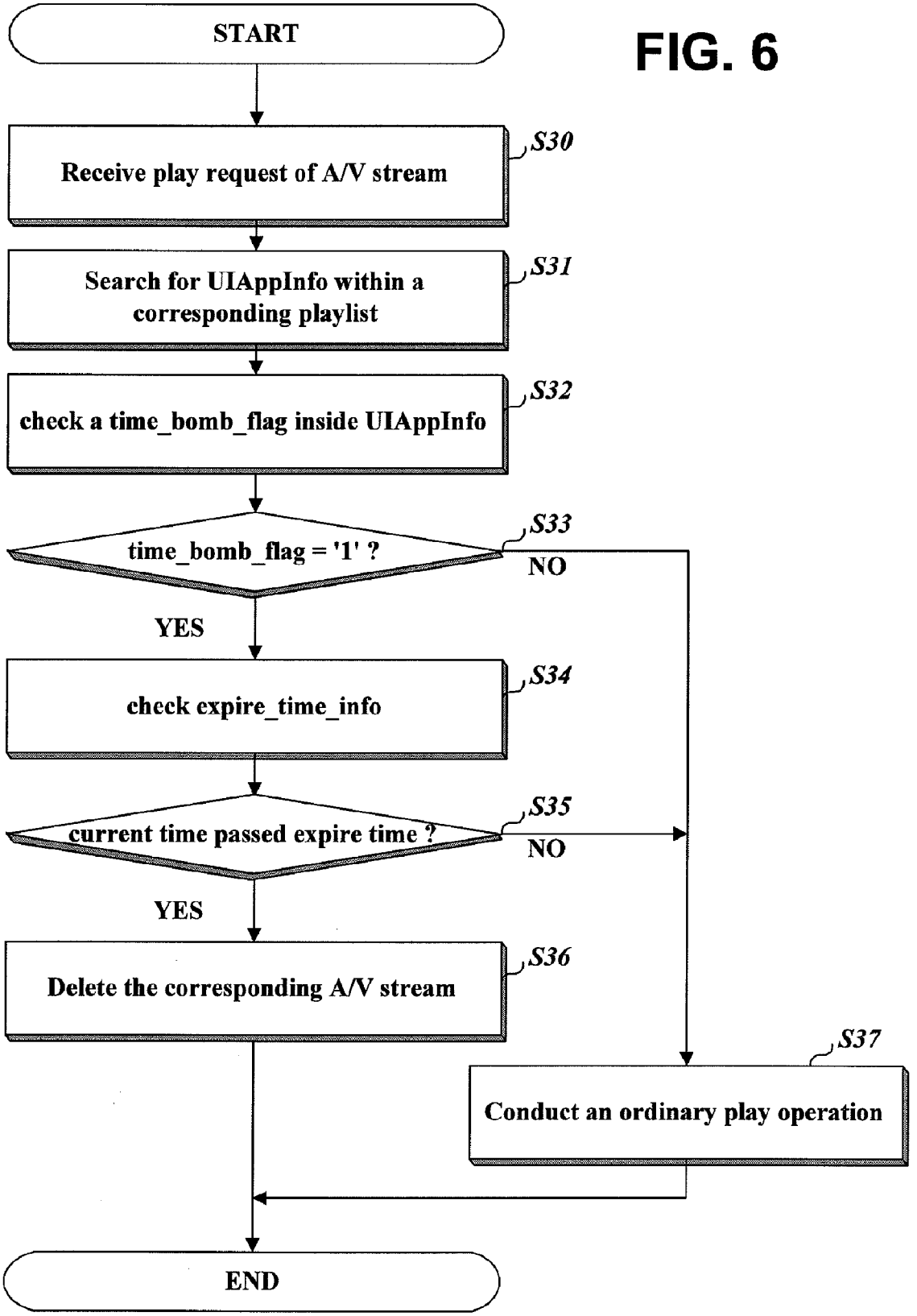

xxxxx.rpls-syntax
xxxxx.rpls{
version_number
PlayLists_start_address
PlayListMark_start_address
MakersPrivateData_start_address
reserved_for_furture_use
UIAppInfoPlayList()
for(i=0; i<N1; i++){
padding_word
}
PlayList()
for(i=0; i<N2; i++){
padding_word
}
}
UIApplinfoPlayList(){
length
reserved_for_furture_use
PlayList_character_set
reserved_for_word_align
time_bomb_flag
if time_bomb_flag =1
{ expire_time_info }
playback_protect_flag
write_protect_flag
is_played_flag
}

FIG. 6


START
Receive play request of A/V stream
S30
Search for UIAppInfo within a corresponding playlist
S31
check a time_bomb_flag inside UIAppInfo
S32
time_bomb_flag = '1' ?
S33
NO
YES
check expire_time_info
S34
current time passed expire time ?
S35
NO
YES
Delete the corresponding A/V stream
S36
Conduct an ordinary play operation
S37
END

METHOD FOR MANAGING RECORDED STREAMS IN A REWRITABLE RECORDING MEDIUM

[0001] This application is a continuation of co-pending U.S. patent application Ser. No. 11/525,923, filed on Sep. 25, 2006, which is a divisional of U.S. patent application Ser. No. 10/446,852, filed on May 29, 2003 (now U.S. Pat. No. 7,206,892 B2), the entire contents of these applications are hereby incorporated by reference. Priority is claimed under 35 U.S.C. § 120; and this application claims priority of Application No. 10-2002-0031749 filed in Korea on Jun. 5, 2002 under 35 U.S.C. § 119.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a method for automatic timed deletion of video and audio streams stored in a recording medium such as a rewritable optical disc.

[0004] 2. Description of the Related Art

[0005] Recently, in accordance with rapid advancement of standardization of a novel high density rewritable recording medium such as 'Blu-ray Disc Rewritable' (hereinafter referred to as BD-RW) where high quality video and audio data can be recorded for many hours, it is expected that related products are soon developed and released to consumer market.

[0006] FIG. **1** illustrates a partial structure of an optical disc apparatus such as a video disc recorder (VDR) which records signals in a recording medium such as BD-RW or plays signals thereof. The said optical disc apparatus may comprise an optical pickup **2** to read out recorded signals from the recording medium such as BD-RW **1** or to record processed data streams from external inputs; a VDR system **3** to process signals read out from the optical pickup **2** for playback or to transform external data streams into those suitable for recording; and an encoder **4** to encode analog signals from external sources to output to the VDR system **3**.

[0007] As illustrated in FIG. **2**, clips of A/V streams recorded in the BD-RW **1**, for example, a first clip of A/V stream (Clip **1** A/V Stream) and a second clip of A/V stream (Clip **2** A/V Stream), each of which is recorded consecutively are managed by a first real playlist (Real PlayList **1**) and a second real playlist (Real PlayList **2**) generated automatically at the time of recording respective A/V streams, wherein respective play control information to read out and play is contained.

[0008] In addition, a playlist making access to sections selectively chosen from a part or whole of the A/V stream clips recorded in said manner can be generated, which is termed as a virtual playlist. Referring to FIG. **2**, within the virtual playlist, a playitem of main path (PlayItem) to read out and play the first clip of A/V stream associated with the first real playlist and a sub playitem of subpath (Sub PlayItem) to read out and play the second clip of A/V stream associated with the second real playlist can be recorded and managed.

[0009] Accordingly, while performing a series of play operations of reading out and playing the first clip of A/V stream managed by the first real playlist, the optical disc apparatus of VDR system **3** can select and play the second clip of A/V stream managed by the second real playlist upon user request.

[0010] On the other hand, the VDR system **3**, in response to user request, may delete or edit a part of the first clip of A/V stream or second clip of A/V stream. As depicted in FIG. **3**, in case a part of the second clip of A/V stream is deleted, the remaining part of the partially deleted A/V stream is broken up into an A/V stream of second clip and an A/V stream of third clip with corresponding second real playlist and third real playlist generated and further managed, wherein play control information to read out and play the A/V streams are incorporated.

[0011] In order to allow a user to randomly select, edit and play real playlists managed by said procedure, a virtual playlist is generated and recorded, wherein the playitem of main path to read out and play the A/V stream of first clip associated with the first real playlist and sub playitem of sub path to read out and play the A/V stream of third clip associated with the third real playlist can be recorded and managed at the same time. Consequently, in response to user request, the VDR system **3** of the optical disc apparatus, while performing a series of play operations of reading out and playing the A/V stream of the first clip associated with the first real playlist, can select and play the A/V stream of the third clip associated with the third real playlist.

[0012] Because an optical disc apparatus of said kind, in response to user request, allows random edition of recorded clips of A/V streams and playing clips of the A/V streams, however, user's unlimited playback or illegal edition of proprietary television programs or movies are made possible, where copyright protection and payment are essential. Presently, however, an effective means to prohibit such behavior is yet to be prepared.

SUMMARY OF THE INVENTION

[0013] By taking these aspects into account, the present invention is directed to provide a method and device for automatic timed deletion of clips of A/V streams in order to protect copyright and secure payment to proprietary television programs and movies which are recorded in a recording medium such as a high density optical disc (BD-RW). The invention provides a method for managing recorded streams in a recording medium, thereby a user's unlimited playback or illegal edition of digital contents recorded in a recording medium can be prohibited, where copyright protection is required.

[0014] A method of managing recorded streams in a rewritable recording medium to in accordance with an embodiment of the present invention comprises the following steps: recording a clip of data stream with time continuity in a rewritable recording medium; and recording additional management information in a playlist in order for automatic deletion of the clip of data stream after predetermined time.

[0015] Another method for managing recorded streams in a rewritable recording medium according to an embodiment of the present invention comprises the following steps: searching for and checking an automatic deletion flag and deletion time information included in a playlist corresponding to a clip of data stream recorded with time continuity in a rewritable recording medium; and determining to conduct an automatic deletion of the clip of data stream with reference to the automatic deletion flag and deletion time information.

[0016] According to another embodiment of the present invention, there is provided a method of managing digital content, comprising: receiving digital content and protection information for protecting the digital content; obtaining at

least one of user interface application data and marker private data; and managing the digital content according to the at least one of user interface application data and marker private data, wherein the managing step prevents a user from performing an action related with unauthorized usage of the digital content.

[0017] According to another embodiment of the present invention, there is provided an apparatus for managing digital content, comprising: a receiver configured to receive digital content and protection information for protecting the digital content; and a controller configured to obtain at least one of user interface application data and marker private data, and to manage the digital content according to the at least one of user interface application data and marker private data, wherein the managing of the digital content prevents a user from performing an action related with unauthorized usage of the digital content.

[0018] These and other objects of the present application will become more readily apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] The accompanying drawings, which are included to provide a further understanding of the invention, illustrate the preferred embodiments of the invention, and together with the description, serve to explain the principles of the present invention.

[0020] In the drawings:

[0021] FIG. **1** is a diagram illustrating a partial structure of an optical disk apparatus such as a video disk recorder (VDR);

[0022] FIG. **2** and FIG. **3** are diagrams depicting a situation wherein clips of A/V streams recorded in a rewritable optical disc (BD-RW), real playlists and a virtual playlist are associated;

[0023] FIG. **4** is a diagram illustrating the file structure of a rewritable optical disc (BD-RW);

[0024] FIG. **5** is a diagram illustrating the syntax of a real playlist with automatic deletion flag (time_bomb_flag) recorded by the method for managing recorded streams according to an embodiment of the present invention; and

[0025] FIG. **6** is a diagram illustrating the operational flowchart of the method for managing recorded streams in a rewritable recording medium according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0026] Hereinafter, preferred embodiments of the present invention for managing recorded streams in a recording medium such as a rewritable medium will be described in detail with reference to appended drawings.

[0027] FIG. **4** is a diagram showing the file structure of a rewritable optical disc (BD-RW). As shown in FIG. **4**, the BD-RW employs a fixed file structure comprising: a root directory at the top of the file structure; at least more than one DVR directories beneath the root directory; a single 'info.dvr' file, 'menu.tidx' files, and 'mark.tidx' files under the DVR directory; PLAYLIST subdirectory where multiple real and virtual playlist files (*.rpls, *.vpls) are placed; CLIPINF subdirectory where multiple clip information files (*.c1pi) are placed; and STREAM subdirectory where multiple record data stream files (*.m2ts) corresponding to respective clip information files are placed.

[0028] On the other hand, record data stream files recorded in the STREAM subdirectory, more specifically, various play control information for '01001.m2ts' and '02002.m2ts' files are recorded in '01001.c1pi' and '02002.c1pi' files respectively, which are placed in the CLIP subdirectory; playlist information which determines serial playing of the '01001.m2ts' and '02002.m2ts' files and order of playing can be recorded in '01001.rpls' file placed in the PLAYLIST subdirectory.

[0029] As depicted in FIG. **5**, within the playlist files (*.rpls, *.vpls), more specifically, in the syntax of a real playlist file (xxxx.rpls), recorded are a version number; start addresses of playlist, playlist mark, and maker private data; and playlist of user interface application information (UIAppInforPlayList) wherein one bit automatic deletion flag (time_bomb_flag) and corresponding deletion time information (expire_time_info) in accordance with an embodiment of the present invention are included. In case the automatic deletion flag is set to '1' in order to prohibit a user's arbitrary unlimited playback or edition of a clip of A/V stream where copyright protection and security for payment are needed, deletion time information is added to automatically delete the corresponding clip of A/V stream; to this purpose, one bit allocated from four bits of reserved area for word alignment by predetermined record size or from another reserved area can be used as the automatic deletion flag.

[0030] In addition, the deletion time information can be added as absolute time information irrespective of start time of playing or relative time information counted from the start of playing, which automatic deletion flag and information of deletion time can be included in a received A/V stream. If not included in the received A/V stream, a disc recorder can set up deletion time and record the automatic flag activated. In this case, deletion time may be assigned by a predetermined value, for example, 'after 96 hours'.

[0031] After recording in this manner, by searching and identifying deletion time information which is stored together with the automatic deletion flag, the optical disc apparatus of VDR system (**3**) automatically deletes the corresponding clip of A/V stream, thereby preventing user's unlimited playback or arbitrary edition thereof, where the automatic deletion flag is set to '1'. This procedure is further described in the following.

[0032] FIG. **6** illustrates the operational flow of the method for managing record streams in a rewritable recording medium according to an embodiment of the present invention. As shown in FIG. **6**, in case a user sends a play request for a clip of A/V stream (S**30**) among the clips of A/V streams stored in the BD-RW **1**, the VDR system **3** searches for a playlist corresponding to the clip of A/V stream, after which it identifies a user interface application information playlist (UIAppInfoPlayList) included therein (S**31**).

[0033] Subsequently, the VDR system **3** searches for and checks the automatic deletion flag (time_bomb_flag) included in the user interface applications information playlist (S**32**); in case when the automatic deletion flag is set to

'1', it searches for and checks the deletion time information (expire_time_infor) linked with the automatic deletion flag (S**34**).

[0034] Thereafter, with reference to the checked deletion time information, in case the absolute time information which is independent of start time of playing coincides with or precedes present time (S**35**), the clip of A/V system is considered to be a proprietary television program or movie with copyright protection or payment required, thereby the A/V stream is deleted (S**36**). On the contrary, when the identified automatic deletion flag (time_bomb_flag) is found to be '0' or the deletion time information (expire_time_info) is set after present time, the VDR system **3** performs an ordinary play operation upon user request (S**37**).

[0035] On the other hand, in case the deletion time information (expire_time_infor) is recorded as a relative time information counted from the start of the initial play of the clip of A/V stream, elapsed time from the initial play of the clip of A/V stream is counted and compared with deletion time information. Subsequently, when the elapsed time counted from the initial play coincides with or exceeds the deletion time information, the A/V stream is deleted, whereas the elapsed time counted from the initial play is less than the deletion time information, an ordinary play operation upon user request is performed.

[0036] Moreover, by adding edition protection flag (edit_protect_flag) to prevent partial deletion or unauthorized edition of the corresponding clip of A/V stream to the user interface application information playlist (UIAppInfo PlayList), thereafter enabling the edition protection flag and the automatic deletion flag and deletion time information to be related each other, copyright protection and secured payment for proprietary television programs or movies can be made effective.

[0037] The foregoing description of the preferred embodiments of the present invention has been presented for purposes of illustration. Thus, those skilled in the art may utilize the invention and various embodiments with improvements, modifications, substitutions, or additions within the spirit and scope of the invention as defined by the following appended claims.

What is claimed is:

1. A method of managing digital content, comprising:
receiving digital content and protection information for protecting the digital content;
obtaining at least one of user interface application data and marker private data; and
managing the digital content according to the at least one of user interface application data and marker private data,
wherein the managing step prevents a user from performing an action related with unauthorized usage of the digital content.

2. The method of claim **1**, wherein the action includes an unauthorized editing or reproduction of the digital content.

3. The method of claim **1**, wherein the user interface application data are accessed in response to a user's request to access the digital content.

4. The method of claim **1**, wherein the user interface application data are conveyed to a user.

5. The method of claim **4**, wherein the user interface application data are conveyed to the user when the user adds the digital content to a playlist for accessing the digital content.

6. An apparatus for managing digital content, comprising:
a receiver configured to receive digital content and protection information for protecting the digital content; and
a controller configured to obtain at least one of user interface application data and marker private data, and to manage the digital content according to the at least one of user interface application data and marker private data, wherein the managing of the digital content prevents a user from performing an action related with unauthorized usage of the digital content.

7. The apparatus of claim **6**, wherein the action includes an unauthorized editing or reproduction of the digital content.

8. The apparatus of claim **6**, wherein the user interface application data are accessed in response to a user's request to access the digital content.

9. The apparatus of claim **6**, wherein the user interface application data are conveyed to a user.

10. The apparatus of claim **9**, wherein the user interface application data are conveyed to the user when the user adds the digital content to a playlist for accessing the digital content.

* * * * *